REMARKS

In the Final Office Action, the Examiner noted that claims 1-13 are pending in the application and that claims 1-13 stand rejected. None of the claims are amended by this response.

In view of the following discussion, the Applicant respectfully submits that none of these claims now pending in the application are anticipated under the provisions of 35 U.S.C. § 102. Thus the Applicant believes that all of these claims are now in allowable form.

Rejections

A. 35 U.S.C. § 102

The Examiner rejected claims 1-13 under 35 U.S.C. § 102(e) as being anticipated by Dye et al. (U.S. Patent 6,567,091, hereinafter "Dye"). The rejection is respectfully traversed.

Claims 1-5 and 9-10

The Examiner alleges that regarding claim 1, Dye in FIGs. 16 and 17 discloses a method comprising all of the aspects and limitations of the Applicant's invention. The Applicant respectfully disagrees.

The Applicant submits that the Dye reference fails to teach, suggest or anticipate each and every element of at least the invention as recited in the Applicant's claim 1, which specifically recites:

> "Method to estimate light sources in a common support space comprising at least one visual data set respectively associated with at least one individual support space having a position in the common support space, a dimension and a size,
>
> wherein the position of the light sources is determined according to the position, the dimension and the size of the individual support space associated with said at least one visual data set and in that said light sources have a color distribution that is determined according to said at least one visual data set."

The Applicant's invention is directed at least in part to a method for estimating light sources in a common support space having at least one visual data set respectively associated with at least one individual support space having a position in the common support space where the position of the light sources is

determined according to the position, the dimension and the size of the individual support space associated with said at least one visual data set.

More specifically and referring to the invention of the Applicant, a scene (including real world scene, computer graphics generated scene and support spaces) is composed of objects (including windows on a screen, reflection color, transparency), light sources (including light distribution, color, source position etc) and observers (including human eye, real camera, computer graphics rendering). Thus, the Applicant respectfully submits that objects, light sources and observers are distinct elements. All of these three elements (objects, light sources and observers) have at least two properties: geometric aspects (position, size, depth, etc) and photometry (intensity, color). The Applicant respectfully points out that geometric and photometric aspects are distinct characteristics.

With respect to the invention of the Applicant, the Examiner alleged that claim 1 is anticipated by Dye figures 16, 17 and col. 34 line 63 to col. 35 line 22. The Applicant respectfully disagrees. As presented above, the Applicant's claim 1 addresses the "determination of light sources" and "determination of color distribution of light sources". This topic is not addressed by Dye. Dye is directed to only object properties (position, color depth i.e. color precision, depth, alpha buffer i.e. transparency). In contrast, the Applicant's invention is directed to light source properties (light source position, light color distribution). These are physically different elements. Thus the Applicant respectfully submits that the Applicant's claim 1 is not anticipated by the teachings of Dye.

Regarding the Examiner's response to the Applicant's argument of the previous reply to the First Office Action, the Examiner argues that the definition of the term "light sources [...] representing the light of a visual data set" is insufficient in the patent application. The Examiner alleges that visual data sets do not contain light sources and that light sources can be pixels. The Applicant respectfully disagrees.

More specifically, as previously recited, the Applicant respectfully submits that visual data sets can contain objects, light sources and observers. As such, if visual data sets do contain pixel intensity and geometry information (as in windows on screen addressed by Dye), the visual data set is in fact the result of observation

of objects and light, i.e. the output of an observer. In contrast to Dye, the Applicant's invention claims estimating light source properties from visual data sets. In case of visual data sets being pixel values, this means estimation of light source properties from pixel values. Instead the Applicant respectfully submits that pixels and light sources are distinct.

As such, the Applicant submits that Dye teaches away from the problem of photometric effects and therefore cannot be considered as anticipating the invention of the Applicant, at least with regards to the Applicant's claim 1.

More specifically, in support of the Applicant's invention, at least as claimed by the Applicant's claim 1 recited above, the Applicant in the Specification, specifically recites:

> "Advantageously, the position of the light sources depends on former positions of the light sources when at least one of said visual data sets is dynamic.
>
> This avoids unnecessary calculations when the visual data set is for example a video. In this case, the light sources position of the previous frames can be kept for the at least following frame." (See Applicant's Specification, page 4, lines 11-16).

And

> "The light source estimation modules 5 and 6 estimate the light sources of the different visual data sets in their own support space as described further in this document.
>
> Once the light source estimation modules have estimated the light sources number, position and spatial color distribution, the visual data sets are sent to the rendering means 7 which project the visual data sets into a for example two-dimensional display using the light source estimation module information. The rendering means 7 can be an OpenGL graphics stack (OpenGL is a trademark of Silicon Graphics Incorporated) on a personal computer graphics card or any other system or method for image synthesis.
>
> An OpenGL stack performs the geometric and photometric projection of visual data of two or three dimensions onto a two dimensional display plane.
>
> The geometric projection determines the position and geometric transformation of the visual data. The photometric projection determines the appearance of the visual data including photometric effects. Using the light sources, the OpenGL stack can generate photometric mutual effects as for example shadowing, specular reflection and cast shadows. Other photometric effects can also be considered." (See Applicant's Specification, page 8, line 12-33).

It is clear from at least the portions of the Applicant's disclosure presented above that the Applicant's invention, at least with respect to claim 1, is directed, at least in part, to a method to estimate light sources in a common support space where the position of the light sources is determined according to the position, the dimension and the size of the individual support space associated with said at least one visual data set. That is, and as presented above, in the invention of the Applicant, light source estimation modules estimate the light sources of the different visual data sets in their own support space. Once the light source estimation modules have estimated the light sources number, position and spatial color distribution, the visual data sets are sent to the rendering means which performs the geometric and photometric projection of visual data of two or three dimensions onto a two dimensional display plane. The geometric projection determines the position and geometric transformation of the visual data and the photometric projection determines the appearance of the visual data including photometric effects. Using the light sources, the photometric mutual effects are then generated.

In contrast to the invention of the Applicant, Dye teaches a graphics controller which performs display list-based video refresh operations that enable objects with independent frame rates to be efficiently assembled. In Dye the graphics controller maintains a virtual display refresh list (VDRL) comprising a plurality of pointers to scan line segments in memory. The graphics controller also creates, maintains, and deletes draw display lists (DDLs) that comprise pointers to object display list subroutines (ODLs) that independently draw objects in memory. The ODLs allocate one or more buffers in memory into which different frames of the objects are drawn. When an ODL has completed executing, the corresponding pointer in the DDL may be updated to point to the buffer location in memory that stores the newly completed object frame. The VDRL is maintained independently (and may be doubled-buffered) and is updated using the DDLs. Motion estimation may be performed by the graphics controller using the different frames of objects that are drawn into memory by the ODLs. (See Dye, Abstract).

However, the Applicant respectfully submits that there is absolutely no teaching, suggestion or disclosure in Dye for a method to estimate light sources in a common support space where the position of the light sources is determined

according to the position, the dimension and the size of the individual support space associated with said at least one visual data set as taught in the Applicant's Specification and claimed by at least the Applicant's claim 1. The Examiner specifically cites FIGs. 16 and 17 and the teachings of col. 34 and col. 35 of Dye for anticipating the Applicant's invention of at least claim 1. However, with respect to FIGs. 16 and 17 and col. 34 and col. 35 as pointed out by the Examiner, Dye specifically recites:

> "FIG. 16 illustrates the display screen 142 including multiple windows and their relative positions. In this example, W0 or window 0, is the matte or the background window, and W1, W2 and W3 are windows which overlap each other within the base window W0. The comers of the windows are indicated by the positions. W0Y0, for example, is the first line of W0 and W2Y20 at the bottom is the last line of window W2, which is at Y position 20. The same positions are true with the X coordinates. This information is programmed by the driver software into the Windows Workspace area of the system memory 110.
>
> FIG. 17 illustrates a single raster scan line roughly corresponding to the display screen 142 of FIG. 16 and the result when the display refresh list method is used. The display refresh list method of the present invention allows the software window managers or drivers to have independent control of each application's color, position depth, and blending functions as well as individual control of indexed color. FIG. 17 presumes that there are four different process windows pointed to by Xn through Xn+3. Each of the four window workspaces contains the starting X/Y position of the window, the color depth, the Z depth, and the alpha value pointers. As shown, the first window is a single RGB direct color. The second window shows direct RGB color along with a depth buffer and an alpha buffer. The third window shows only a simple gray scale window while the fourth buffer shows gray scale with a depth buffer." (See Dye, col. 34, line 63 through col. 35, line 22).

In the passages described above, Dye teaches and describes, with reference to FIG. 16, a display screen including multiple windows and their relative positions. Dye further teaches and describes, in FIG. 17, a single raster scan line roughly corresponding to the display screen of FIG. 16 and the results of a display refresh list method. Specifically, Dye teaches that the display refresh list method of the invention allows the software window managers or drivers to have independent control of each application's color, position depth, and blending functions as well as individual control of indexed color. That is, in Dye the software window managers or drivers have control of the color distribution across the windows.

However, there is absolutely no teaching, suggestion or disclosure in Dye for a method to estimate light sources in a common support space "wherein the position of the light sources is determined according to the position, the dimension and the size of the individual support space associated with said at least one visual data set" as taught in the Applicant's Specification and claimed by at least the Applicant's claim 1. That is, Dye absolutely fails to teach, suggest or anticipate the positioning of the light sources according to the position, the dimension and the size of the individual support space associated with at least one visual data set as taught in the Applicant's Specification and claimed by the Applicant's claim 1.

As such and at least because the teachings of Dye fails to teach, suggest or disclose at least a method to estimate light sources in a common support space "wherein the position of the light sources is determined according to the position, the dimension and the size of the individual support space associated with said at least one visual data set" as taught in the Applicant's Specification and claimed by at least the Applicant's claim 1, the Applicant respectfully submits that the teachings and disclosure of Dye do not anticipate the Applicant's invention, at least with respect to claim 1. That is, Dye fails to disclose each and every element of the claimed invention, arranged as in the Applicant's claim as required for anticipation.

Therefore, the Applicant submits that for at least the reasons recited above independent claim 1 is not anticipated by the teachings of Dye and, as such, fully satisfies the requirements of 35 U.S.C. § 102 and is patentable thereunder.

Likewise, independent claim 9 recites similar relevant features as recited in the Applicant's independent claim 1. As such, the Applicant submits that for at least the reasons recited above independent claim 9 is also not anticipated by the teachings of Dye and also fully satisfies the requirements of 35 U.S.C. § 102 and is patentable thereunder.

Furthermore, dependent claims 2-5 and 10 depend directly from independent claims 1 and 9, respectively, and recite additional features therefor. As such and for at least the reasons set forth herein, the Applicant submits that dependent claims 2-5 and 9 are also not anticipated by the teachings of Dye.

Therefore the Applicant submits that dependent claims 2-5 and 9 also fully satisfy the requirements of 35 U.S.C. § 102 and are patentable thereunder.

Claims 6-8 and 11-12

The Examiner alleges that claim 6 is similar to claim 1 but further requires applying estimated light source information derived from said estimated light sources for at least a first of said visual data sets to at least a second of said visual data sets so that the first visual data sets illuminates the second visual data set. The Examiner further alleges that Dye at column 5 lines 8-34 discloses alpha blending and such teachings anticipate the Applicant's claim 6. The Applicant respectfully disagrees.

As recited above and for at least the reasons recited above, the Applicant respectfully submits that the teachings of Dye alone fail to teach, suggest or anticipate the Applicant's independent claim 1. As such, the Applicant further submits that the teachings of Dye also fail to teach, suggest, anticipate or make obvious the Applicant's claim 6, which as conceded by the Examiner, recites similar limitations as the Applicant's claim 1 but recites the additional feature of applying estimated light source information derived from said estimated light sources for at least a first of said visual data sets to at least a second of said visual data sets so that the first visual data sets illuminates the second visual data set.

However, the Applicant further respectfully submits that the teachings of Dye also do not teach, suggest, anticipate or make obvious the further limitation of applying estimated light source information derived from said estimated light sources for at least a first of said visual data sets to at least a second of said visual data sets so that the first visual data sets illuminates the second visual data set as recited in at least the Applicant's independent claim 6.

More specifically, in support of at least claim 6, the Applicant in the Specification specifically recites:

> "The invention relates also to a method to generate mutual photometric effects in a common support space between a plurality of visual data sets respectively associated with individual support spaces, in which one positions the visual data sets in a common support space
> wherein:
> - one estimates light sources for each of said visual data sets, and

- one applies estimated light source information derived from said estimated light sources for at least a first of said visual data sets to at least a second of said visual data sets so that the first visual data set illuminates the second visual data set.

As opposed to the known methods, this method is not based on global illumination, which is of high computational cost. The proposed method can generate photometric effects from a small number of light sources that represent the light of the visual data sets." (See Applicant's Specification, page 4, line 22 through pate 5, line 4).

And

"In a preferred embodiment, before applying said estimated light source information derived from said estimated light sources for said first visual data set to said second visual data set, one moves at least one of said light sources out of the individual support space associated with said first visual data set." (See Applicant's Specification, page 5, lines 11-15).

It is clear from at least the portions of the Applicant's disclosure presented above that the Applicant's invention, at least with respect to claim 6, is directed at least in part to a method to generate mutual photometric effects in a common support space between visual data sets including estimating light sources for each of said visual data sets, and applying estimated light source information derived from said estimated light sources for at least a first of said visual data sets to at least a second of said visual data sets so that the first visual data set illuminates the second visual data set.

The Applicant respectfully submits that there is absolutely no teaching, suggestion or disclosure in Dye for a method to generate mutual photometric effects in a common support space between visual data sets including estimating light sources for each of said visual data sets, and applying estimated light source information derived from said estimated light sources for at least a first of said visual data sets to at least a second of said visual data sets so that the first visual data set illuminates the second visual data set as taught in the Applicant's Specification and claimed by at least the Applicant's claim 6. The Examiner specifically cites col. 5 lines 8-34 of Dye for anticipating the Applicant's invention of at least claim 6, however, with respect to col. 5 lines 8-34 as pointed out by the Examiner, Dye specifically recites:

"The VDRL Engine of the present invention uses the display refresh list constructed by the Execution Engine to perform pointer-based or display list-based video refresh operations according to the present invention. The display refresh list operations enable screen refresh data to be assembled

> on a per window or per object basis, thereby greatly increasing the performance of the graphical display. The VDRL Engine includes memory mapped I/O registers storing values which point to various buffers or object information memory areas in system memory comprising video or graphics display information. The IMC includes an ID pointer register which points to a Windows ID list. The Windows ID list comprises a list of pointers for each of the windows or objects appearing on the display screen. Each respective pointer in the Windows ID list points to respective windows workspace memory areas corresponding to the window. The windows workspace areas specify data types, color depths, 3D depth values, alpha blending information, screen position, window attributes, etc. for the respective window or object on the screen. Each windows workspace area also includes static and dynamic pointers which point to the location in system memory where the pixel data for the respective window or object is stored. Each windows workspace area also optionally includes a pointer to a color composition matrix for color indexing on a per object or per window basis, a secondary workspace pointer for rendering overlaid objects, and optional slope information for rendering non-rectangular objects." (See Dye, col. 5, lines 8-34).

In the passage described above, Dye teaches and describes that a Windows ID list comprises a list of pointers for each of the windows or objects appearing on a display screen. Dye further explains that each respective pointer in the Windows ID list points to respective windows workspace memory areas corresponding to the window. The windows workspace areas specify data types, color depths, 3D depth values, alpha blending information, screen position, window attributes, etc. for the respective window or object on the screen. Dye further discloses that the Execution Engine utilizes the information in the Window Workspace buffer, as well as information received from the software driver regarding screen changes, to assemble a display refresh list in system memory. However, there is absolutely no teaching, suggestion or disclosure in Dye for estimating light sources for each of said visual data sets, and applying estimated light source information derived from said estimated light sources for at least a first of said visual data sets to at least a second of said visual data sets so that the first visual data set illuminates the second visual data set as taught in the Applicant's Specification and claimed by at least the Applicant's claim 6. That is, Dye fails to teach, suggest or anticipate that before applying said estimated light source information derived from said estimated light sources for said first visual data set to said second visual data set,

one moves at least one of said light sources out of the individual support space associated with said first visual data set.

As such and at least because, as described above, the teachings of Dye fail to teach, suggest or disclose the aspects of claim 6 that are similar to claim 1, as conceded by the Examiner, the Applicant respectfully submits that the teachings and disclosure of Dye do not anticipate the Applicant's invention, at least with respect to claim 6. In addition, and at least because the teachings of Dye fail to teach, suggest or disclose at least a method to generate mutual photometric effects in a common support space between visual data sets including estimating light sources for each of said visual data sets, and applying estimated light source information derived from said estimated light sources for at least a first of said visual data sets to at least a second of said visual data sets so that the first visual data set illuminates the second visual data set as taught in the Applicant's Specification and claimed by at least the Applicant's claim 6, the Applicant further respectfully submits that the teachings and disclosure of Dye do not anticipate the Applicant's invention, at least with respect to claim 6 for those reasons. That is, Dye fails to disclose each and every element of the claimed invention, arranged as in the Applicant's claim as required for anticipation.

Therefore, the Applicant submits that for at least the reasons recited above independent claim 6 is not anticipated by the teachings of Dye and, as such, fully satisfies the requirements of 35 U.S.C. § 102 and is patentable thereunder.

Likewise, independent claim 11 recites similar relevant features as recited in the Applicant's independent claim 6. As such, the Applicant submits that for at least the reasons recited above independent claim 11 is also not anticipated by the teachings of Dye and also fully satisfies the requirements of 35 U.S.C. § 102 and is patentable thereunder.

Furthermore, dependent claims 7-8 and 12 depend directly from independent claims 6 and 11, respectively, and recite additional features therefor. As such and for at least the reasons set forth herein, the Applicant submits that dependent claims 7-8 and 12 are also not anticipated by the teachings of Dye. Therefore the Applicant submits that dependent claims 7-8 and 12 also fully satisfy the requirements of 35 U.S.C. § 102 and are patentable thereunder.

The Applicant reserves the right to establish the patentability of each of the claims individually in subsequent prosecution.

Claim 13

Claim 13 combines the inventive aspects of both claim 9 and claim 11. As such, and for at least the reasons that Dye fails to anticipate the Applicant's claims 9 and 11 as described above, the Applicant further respectfully submits that Dye also fails to teach, suggest or anticipate the Applicant's claim 13 which recites similar relevant features as recited in the Applicant's independent claims 9 and 11.

Therefore, the Applicant submits that for at least the reasons recited above independent claim 13 is not anticipated by the teachings of Dye and, as such, fully satisfies the requirements of 35 U.S.C. § 102 and is patentable thereunder.

Conclusion

The Applicant respectfully submits that none of the claims, presently in the application, are anticipated under the provisions of 35 U.S.C. § 102. Consequently, the Applicant believes that all these claims are presently in condition for allowance. Accordingly, both reconsideration of this application and its swift passage to issue are earnestly solicited.

No fee is believed due. However, if a fee is due, please charge the additional fee to Deposit Account No. 07-0832.

Respectfully submitted,
JURGEN STAUDER

By: ______________________

Jorge Tony Villabon, Attorney
Reg. No. 52,322
(609) 734-6445

Patent Operations
Thomson Licensing Inc.
P.O. Box 5312
Princeton, New Jersey 08543-5312

February 06, 2005